

Code No: 126BE**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech III Year II Semester Examinations, May - 2016****ANALOG AND DIGITAL IC APPLICATIONS****(Mechanical Engineering (Mechatronics))****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Describe the chip size and circuit complexity. [2]
- b) Derive the expression for voltage gain of non-inverting amplifier. [3]
- c) Describe the introduction to voltage regulators. [2]
- d) Explain the features of 723. [3]
- e) Describe the operation of astable multivibrator. [2]
- f) Explain the principle of monostable multivibrator. [3]
- g) What are tristate gates? [2]
- h) Describe the operation of TTL open collector O/Ps. [3]
- i) Give the pin configuration of decade counter, 7490. [2]
- j) What are different shift registers? [3]

PART - B**(50 Marks)**

- 2.a) Derive the expression for voltage gain of instrumentation amplifier.
- b) An op-amp is being used as voltage-to-current converter. The value of resistance used in the circuit R is $6.8\text{ K}\Omega$, $R_L = 2\text{ K}\Omega$, $V_1 = 5\text{V}$, $V_2 = 0\text{V}$. Determine the values of I_L , V_L and V_o . Draw the circuit. [6+4]

OR

- 3.a) Describe the principle of op amp differentiator.
- b) In an op-amp I/V converter circuit, V_o is 6V , $R_F = 470\text{ K}\Omega$. Determine the value of short circuit current I_{sc} . [6+4]
- 4.a) Describe the operation of all pass filters.
- b) Determine the component values for a fourth order Butterworth HPF with $f_c = 15\text{ KHz}$, given $2K_1 = 0.765$ and $K_2 = 1.848$. [5+5]

OR

- 5.a) Explain the principle of triangular waveform generator.
- b) Determine a second order BPF using op amps, given $2K = 1.414$, to pass signals in the band of 2 KHz to 20 KHz . [5+5]
- 6.a) Give the details of IC 1408 DAC.
- b) What is the percentage resolution of a 4 bit DAC given that the maximum number that can be represented using 4 bits is 15? [6+4]

OR

- 7.a) Explain the operation of dual slope ADC.
 b) In a dual slope ADC, a $3\frac{1}{2}$ digit BCD counter is used and the signal is integrated until the two most significant bits of the counter are 1. What is the decimal count? [6+4]
- 8.a) Describe CMOS transmission gate.
 b) The following sequences of bits (right-most bit first) appear on the inputs to a 4-bit parallel adder. Determine the resulting sequence of bits on each sum output. [4+6]
 A_1 1101 ; A_2 1110 ; A_3 0000 ; A_4 1011
 B_1 1111 ; B_2 1100 ; B_3 1010 ; B_4 0010
- OR**
- 9.a) Describe CMOS driving TTL.
 b) Explain the principle of decoders and drives for LED and LCD display. [4+6]
- 10.a) Describe the familiarities with commonly available CMOS 40XX series of IC counters.
 b) Design a counter to produce the following binary sequence. Use JK flip flops. [5+5]
 1,4,3,5,7,6,2,1,- - - - -
- OR**
- 11.a) Explain the function of synchronous DRAMs.
 b) Draw a basic logic diagram for a 512×8 – bit static RAM, showing all the inputs and outputs.
 c) Design a counter to produce the following sequence. Use J-K flip flops. [4+3+3]
 00, 10, 01, 11, 00, - - - - -

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